

REMARKS

By this response, claims 1 and 3-5 have been amended without narrowing their scope, and new claims 6-13 have been added, leaving claims 1-13 pending in the application. Support for the amendments to claim 1 (and for new claims 12 and 13) is provided, for example, at page 8, lines 16-29 of the present specification. Support for claims 6-11 is provided, for example, in the original claims. The specification has been amended to address minor informalities, including obvious typographical errors. No new matter has been added to the application by the amendments.

Reconsideration and allowance of the application are respectfully requested in light of the following remarks.

Priority Document

A certified copy of the priority document is attached. Although the Office Action indicates that a certified copy of the priority document has been received by the USPTO, Applicants respectfully request the Examiner to acknowledge receipt of the attached copy of the priority document in the next Office communication.

Obviousness-Type Double Patenting

Claims 1-5 stand rejected under the doctrine of obviousness-type double patenting over claims 1-3 of co-pending U.S. Patent Application No. 10/726,608 for the reasons stated at pages 2-3 of the Official Action.

Applicants will again consider the propriety of submitting a Terminal Disclaimer with respect to the '608 application upon the indication of allowable subject matter in this application.

Rejection Under 35 U.S.C. § 103

Claims 1-5 stand rejected under 35 U.S.C. § 103(a) over G. Antonelli, "Non-Destructive Condition Assessment of Serviced MCrAlY Coatings" ("Antonelli") or G. Antonelli et al., "Qualification of a Frequency Scanning Eddy Current Equipment for Nondestructive Characterization of new and Serviced High-Temperature Coatings" ("Antonelli et al.") in view of "admitted prior art of the instant disclosure" ("APA"). The reasons for the rejection are stated on pages 3-4 of the Office Action. The rejection is respectfully traversed.

Claim 1, as amended, recites "a method of determining the depletion of Al and Cr of a γ/γ' MCrAlY-coating applied to a component after use in a high temperature environment, the γ/γ' MCrAlY-coating exhibiting a non-equilibrium γ/γ' -microstructure at a temperature lower than the temperature during operation, the method comprising: (a) applying a defined annealing heat treatment to the γ/γ' MCrAlY-coated component to transform the non-equilibrium high temperature γ/γ' -microstructure into the equilibrium room temperature microstructure with a α -Cr phase, (b) measuring qualitative impedance curves or the coating electrical conductivity and magnetic permeability of the MCrAlY-coating by means of a multi-frequency eddy current system, and (c) determining the Al and/or Cr depletion of the coating from the measured qualitative impedance curves or coating conductivity and permeability" (emphasis added).

As explained at page 3, lines 10-16 of the present specification, during an engine stop from the operating temperature down to below 600°C, a γ/γ' MCrAlY-coating exhibits a non-equilibrium γ/γ' -microstructure at room temperature due to the rapid cooling. Equilibrium phases, which are stable at low temperatures, such as the α -Chromium phase, can not re-precipitate during the rapid cooling. The resulting non-equilibrium microstructure of the coating results in a modified coating conductivity. Consequently, a reliable NDT coating assessment using the multi-frequency eddy current method cannot be obtained.

In light of this problem, Applicants determined that by subjecting a component including an applied γ/γ' MCrAlY-coating to the heat treatment recited at (a) in claim 1 after using the component in a high temperature environment, where the γ/γ' MCrAlY-coating exhibits a non-equilibrium γ/γ' -microstructure at a temperature lower than the temperature during operation, a non-destructive testing method can be used to determine Al and/or Cr depletion within the γ/γ' MCrAlY-coating.

Applicants respectfully submit that the applied art fails to teach or suggest the method recited in claim 1. More particularly, in contrast to the claimed method, Antonelli and Antonelli et al. both disclose a method of measuring the electrical conductivity and magnetic permeability of a γ/β -MCrAlY coating using a multi-frequency eddy current system. See, for example, Antonelli at page 7, fourth paragraph. In contrast, the claimed method is directed to determining the depletion of Al and Cr of a γ/γ' MCrAlY-coating. As described at page 2, line 4 to page 3, line 16, and at page 5, line 28 to page 6, line 33 of the present specification, γ/β -MCrAlY coatings and γ/γ' MCrAlY-coatings are different from each other.

Not only do Antonelli and Antonelli et al. both fail to disclose a method of measuring the electrical conductivity and magnetic permeability of a γ/γ' -MCrAlY coating, it is admitted in the Office Action that Antonelli and Antonelli et al. also fail to disclose or suggest the features of "applying a defined annealing heat treatment to the γ/γ' MCrAlY-coated component to transform the non-equilibrium high temperature γ/γ' -microstructure into the equilibrium room temperature microstructure with a α -Cr phase," as recited in claim 1. However, it is asserted in the Office Action that APA cures the deficiencies of Antonelli and Antonelli regarding the recited heat treatment. Applicants respectfully disagree.

Not only do Antonelli and Antonelli et al. both disclose a method of measuring the electrical conductivity and magnetic permeability of a γ/β -MCrAlY coating, Applicants submit that the method disclosed in Antonelli and Antonelli et al. is only applicable for γ/β -MCrAlY coatings due to the structural characteristics of such coatings. Neither Antonelli nor Antonelli discloses that a component, which is coated with a γ/β -MCrAlY and was used in a high temperature environment, needs to be treated with a defined heat treatment to transform a non-equilibrium high temperature γ/γ' -microstructure into the equilibrium room temperature microstructure with a α -Cr phase before measuring the coating using a multi-frequency eddy current system.

Moreover, Applicants submit that APA does not suggest modifying either of Antonelli or Antonelli et al. to include the features of (a) recited in claim 1. At page 5, line 20 of the present specification, "the standard heat treatment" is described. However, this particular heat treatment is a diffusion heat treatment carried out directly after the coating process. The diffusion heat treatment is different from the

“defined annealing heat treatment” recited at (a) in claim 1. The recited “defined heat treatment” is performed after the component has been used in a high temperature environment, resulting in the γ/γ' -MCrAlY coating applied to the component exhibiting a non-equilibrium γ/γ' -microstructure at a temperature lower than the temperature during operation. APA does not disclose or suggest the recited “defined annealing heat treatment,” and thus provides no motivation to modify Antonelli or Antonelli et al. to include the features recited in (a) in claim 1. Accordingly, the applied art does not support the alleged *prima facie* case of obviousness.

To demonstrate the effect of the recited “defined annealing heat treatment” on an SV20 coating, Applicants have attached two figures showing the relationship between estimated ECT and reference ECT for coatings that had not been subjected to heat treatment according to the claim 1 (left curve) and coatings that had been subject to heat treatment (right curve). These figures show that there is a very poor correlation between the values without the heat treatment, but a good correlation between the values after the heat treatment. Applicants submit that these comparative results provide further evidence of the unobviousness of the claimed method.

For at least the foregoing reasons, Applicants submit that the applied combination of references would not have rendered obvious the claimed method. Accordingly, claim 1 is patentable over the applied references. Dependent claims 2-5 are also patentable for at least the same reasons as those for which claim 1 is patentable.

Therefore, withdrawal of the rejection is respectfully requested.

New Claims

New dependent claims 6-13 each depend directly or ultimately from claim 1 and thus are also patentable.

Conclusion

For the foregoing reasons, allowance of the application is respectfully requested. Should there be any questions concerning this response, or the application in general, Applicants' undersigned representative can be reached at the telephone number given below.


Respectfully submitted,

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